



Assembly Technologies

Tau Controller User Manual

Software Version QC0-3.5.0



Important Safeguards

For your protection, please read these instructions completely, and keep this manual for future reference. Carefully observe and comply with all warnings, cautions and instructions placed on the equipment or described in this manual.

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TauUser1208

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Tau Controller

Getting Started

This manual is intended to promote proper and safe use and give guidance to owners, employers, supervisors, and others responsible for training and safe use by operators and maintainers. Please contact your Stanley Sales Engineer for further information or assistance on Stanley training or assembly tool operations.

1.1 EC Directives

The QPM tightening systems are designed and built, in whole or in part, using the following standards and or directives.

2006/42/EC Machinery Directive




Standard	Title / Description
EN292-1,2	<i>Safety of Machinery - Basic Concepts</i>
EN14121-1	<i>Safety of Machinery - Principles of Risk Assessment</i>
EN50178	<i>Electronic Equipment for Use in Power Installations</i>
EN60204-1	<i>Safety of Machinery, Part 1 - Electrical Equipment of Machines</i>
EN60745-1	<i>Hand-Held Motor-Operated Electric Tools - Safety</i>

89/336/EEC Electromagnetic Compatibility Directive

Standard	Title / Description
EN55011	<i>Conducted and Radiated Emissions</i>
EN61000-3-2	<i>Current Harmonics</i>
EN61000-3-3	<i>Voltage Fluctuation and Flicker</i>
EN61000-4-3	<i>Radiated Immunity</i>
EN61000-4-4	<i>Fast Burst Transients</i>
EN61000-4-5	<i>Surge</i>
EN61000-4-6	<i>Conducted Immunity</i>
EN61000-4-8	<i>Magnetic Immunity</i>
EN61000-4-11	<i>Voltage dips/interruptions</i>
EN61000-4-2	<i>Electrostatic Discharge Immunity Level 4: Contact Discharge 8 KV, Air Discharge 15 KV</i>

1.2 Warnings and Cautions

The safety notices and warnings for protection against loss of life (the users or service personnel) or for the protection against damage to property are highlighted in this document by the terms and pictograms defined here. The terms used in this document and marked on the equipment itself have the following significance:

Danger	Indicates that death or severe personal injury will result if proper precautions are not taken.		Indicates a general hazard. This icon appears as a part of a Danger, Warning, or Caution notice.
Warning	Indicates that death or severe personal injury may result if proper precautions are not taken.		Indicates that eye protection should be worn. This icon appears as a part of a Danger, Warning, or Caution notice.
Caution	Indicates that property damage may result if proper precautions are not taken.		Read and understand all the safety recommendations and all operating instructions before operating tools and controllers.



Indicates an electrical hazard. This icon appears as a part of a Danger, Warning, or Caution notice.



Indicates an item of special interest.



WARNING

To Avoid Injury:

- Read and understand all the safety recommendations and all operating instructions before operating tools and controllers. Save these instructions for future reference.
- Train all operators in the safe and proper use of power tools. Operators should report any unsafe condition to their supervisor.
- Follow all safety recommendations in the manual that apply to the tools being used and the nature of the work being performed.
- Verify that all warning labels illustrated in this manual are readable. Replacement labels are available at no additional cost from **STANLEY ASSEMBLY TECHNOLOGIES**.

Qualified Personnel



WARNING

To Avoid Injury:

- Only allow suitably qualified personnel to install, program, or maintain this equipment and or system.
- These persons must be knowledgeable of any potential sources of danger and maintenance measures as set out in the Installation, Operations, and Maintenance manual.
- This product must be transported, stored, and installed as intended, and maintained and operated with care to ensure that the product functions correctly and safely.
- Persons responsible for system planning and design must be familiar with the safety concepts of automation equipment.

1.3 Specifications, Connections and Display

Dimensions	Width:	6.0 in	152 mm		
	Height:	14.2 in	361 mm		
	Depth:	8.2 in	208 mm		
Weight:		15 lb	7.0kg		
Operating Conditions:	Temperature:	32 to 122 °F (0 to +50 °C)			
	Humidity:	0 to 95 % non-condensing			
Power Source:	100 – 126 VAC, 50/60 Hz, 15 – 20A service or 207 – 253 VAC, 50/60 Hz, 10 – 16A service				
Power Consumption:	Stand by:			0.2 A (amperes)	
	Continuous:			1-2.5 kVA	
Tool Motor Power:	Service Rating:	EC02/EC22	EC33/EC34	EC44/E45	EC55
Consumption	@ 115 VAC:	15A	15A	20A	---
	@ 230 VAC:	10A	10A	10A	16A
	Continuous kVA:	0.3	0.7	1	1.7

Tau Controller



Item	Functional Description
1	Red, Green, Yellow LED's for Limits Evaluation
2	Display
3	Cursor Keys with Center Button to Expand Lists
4	Maintenance Due and ATC _(Patented) Active LED's
5	Functional Keypad to Select Options
6	Controller Label and Serial Number
7	Power Switch
8	Power Receptacle Auto Detects 115 or 230 VAC
9	24 VDC Input/Output Connector
10	20A Fuse
11	Serial Connector Support
12	Tool Connector

1.4 Installation Instructions



WARNING

To Avoid Injury:

- Always wear eye and foot protection when installing equipment.
- Only use equipment and accessories specifically designed to operate with Stanley assembly tools and use them only in the manner for which they are intended.
- Do not install worn, damaged, or modified equipment that may be unsuitable for safe use.
- Train all operators in the safe and proper use of power tools. Operators should report any unsafe condition.
- Store idle tools and accessories in a safe location accessible only by trained persons.
- Disconnect power source (air, electricity, etc.) from tool prior to making adjustments, changing accessories, or storing.
- Prior to operation, always check and test tools and accessories for damage, misalignment, binding or any other condition that may affect operation. Maintenance and repair should be performed by qualified personnel.
- Do not operate tools in or near explosive environments or in the presence of flammable liquids, gases, dust, rain or other wet conditions.
- Keep the work area clean, well lit and uncluttered.
- Keep unauthorized personnel out of the work area.

DC Electric Tools & Controllers:

- Install tools in dry, indoor, non-flammable, and non-explosive environments only – Humidity: 0 to 95% non-condensing and Temperature: 32 to 122 °F (0 to +50 °C).
- Installation, maintenance and programming should be performed by qualified personnel. Follow all manufacturer installation instructions and applicable regulatory electrical codes and safety codes.
- Tool and controller plugs must match the outlet. This equipment must be earth grounded. Never modify a plug in any way or use any adaptor plugs.
- Avoid body contact with electrically energized surfaces when holding a grounded tool.
- Prior to connecting a power source, always ensure the tool or controller is turned off.
- Limit controller access to trained and qualified personnel. Lock controller cabinets.



WARNING

To Avoid Injury:

- Install modules in dry, indoor, non-flammable, and non-explosive environments only.
- Qualified personnel should perform installation and programming. Follow all manufacturer installation instructions, applicable regulatory electrical codes, and safety codes.
- Limit module access to trained and qualified personnel. Lock module cabinets.



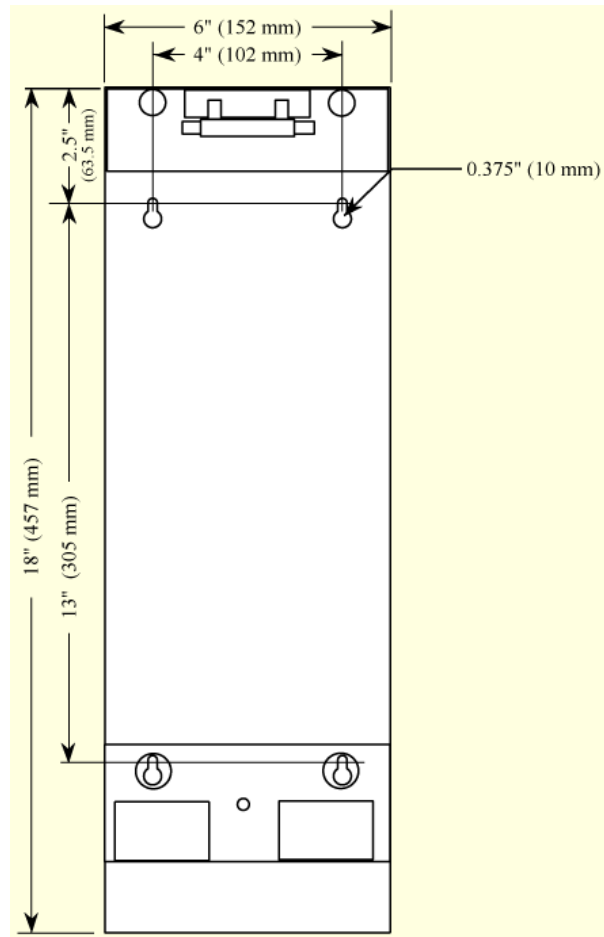
WARNING

ELECTRICAL HAZARD

To Avoid Injury:

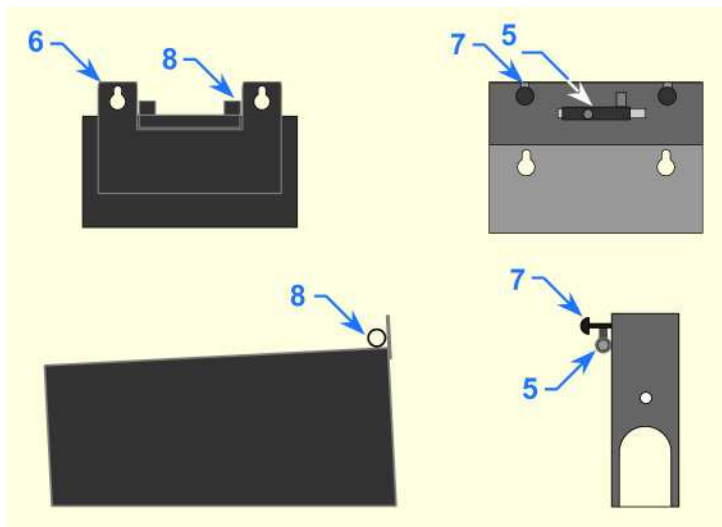
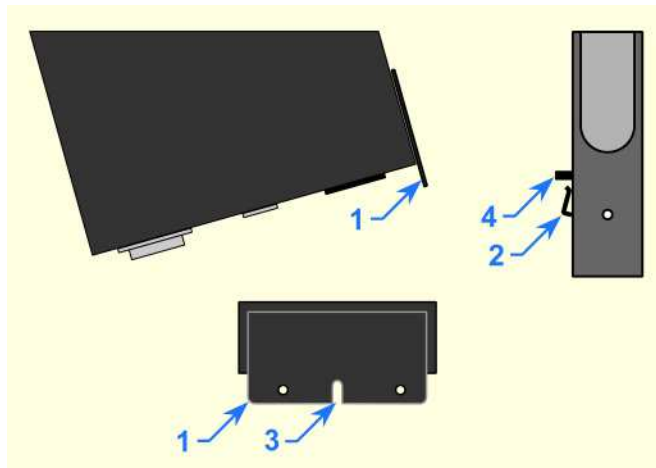
- Install modules in dry, indoor, non-flammable, and non-explosive environments only.
- Do not use this product near water, for example near a washbowl, wet basement, or the like.
- This product should be located away from heat sources such as radiators or other devices that produce heat.
- This product should not be subjected to vibration or shock or in close contact with water or other liquids.
- To minimize electrical interference, place the module as far away from possible sources of electrical noise, such as arc welding equipment.

Tau Controller



Mounting brackets or plinths are optional with the Tau controller. If one is required specify part number 21E204300 when ordering.

Plinths connect to each other with four 10-32 machine screws through openings on the top and right side to threaded openings on the bottom and left side. When mounting plinths are placed next to each other the center to center distance between the mounting holes in different plinths is 2" (50.8 mm). When mounting plinths are placed one above another the center to center distance between the mounting holes in different plinths is 6" (152.4 mm).



1. Install the Tau Controller either directly to the wall or to an optional mounting plinth.
2. Fasteners through four mounting holes secure plinths to a wall or surface. Plinths can be connected using 10-32 threaded holes on the bottom and left side and through holes on the top and right side.
3. Make sure the bolts of the barrel-latches [5] on the plinth are retracted. Place the lower flange of the Tau controller [1] into the lip [2] on the plinth.
4. Align the slot [3] in the flange with the lower mounting-pin [4] on the plinth while placing. Rotate the top of the controller back towards the plinth.
5. Place the openings on the upper flange of the controller [6] over the upper mounting pins [7] on the plinth. Release the bolts on the barrel-latches [5] making sure the bolts enter the two barrels [8] on the controller.
6. Connect the Tau Controller to a power source.
7. Connect the tool cable to the Tau controller and press the power switch on the controller.

1.4.1 Tau Controller E-Stop Precaution



WARNING

INTEGRATED E-STOP CIRCUIT NOT PRESENT

To Avoid Injury:

When a Tau controller connects to a tool where a fault can result in personal injury or substantial damage to property, an E-stop circuit is required. An E-stop circuit must be created in the external power supply line.

Tau Controller

Programming

2.1 Theory of Operation

The Tau controller is designed as a low cost, minimum feature, introductory, transducerized DC tool controller. It will control any QPM EC model series tool. It does not control E or EA model series tools. A Torque Control / Angle Monitor (TC/AM) strategy is the only strategy supported in either of the Tau's two Jobs.

The Tau's TC/AM strategy uses the Low Angle Limit to detect cross-threads and double hits. The High Angle Limit is used to detect stripped fasteners.

2.1.1 Data Collection and Storage

The Tau does not store any data such as fastening cycle results or traces. There is no data created, therefore no data can be retrieved even with the Controller Gateway software connected.

2.1.2 Input and Output Functions

The Tau performs Bolt Count functions for each Job. The Tau controller's four inputs and four outputs support Error Proofing functions by external devices such as a PLC.

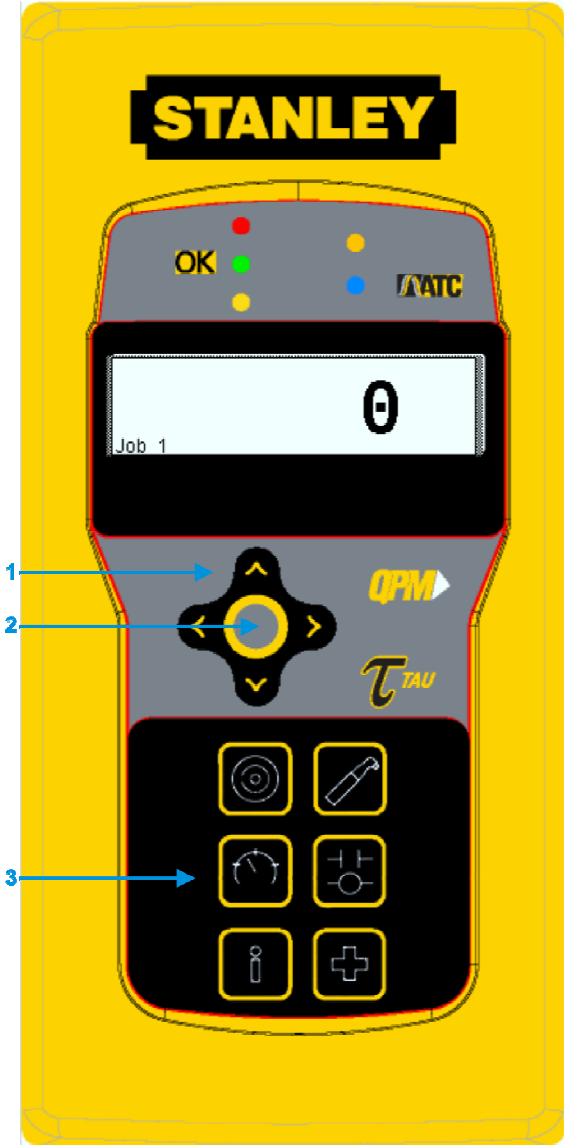
The inputs and outputs are not assignable, they are fixed. However, the Latch Start input, JOB COMPLETE and NOK output Types have a timing configuration.

The outputs have two pins assigned to each; one for the Normally Open contact and another for the Normally Closed contact.

2.2 Software

The Controller Gateway connects to the Tau for service related items such as firmware upgrades of the tool or controller and tool configuration changes.

2.3 QA Tau Controller Navigation and Programming



The Tau controller’s two navigation and input areas facilitate menu navigation, selection and data input:

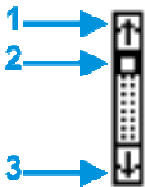
- Arrows and Toggle button
- Keypad

The up/down arrows [1] navigate menu and character selections; the left/right arrows enable backspace and space, as well as navigation between tabs. The toggle button [2] switches between modes and selects/accepts choices (synonymous with **OK** menu button).

The keypad [3] facilitates parameter programming and saving.

2.4 Display

2.4.1 Scroll Bar



A scroll bar appears when more items are available than space within the display allows. The up arrow [1] and down arrow [3] direct scrolling. The black/white scroll bar [2] indicates which list items are currently displayed. No scroll bar means all items are currently displayed.

To navigate between menu items, use the up/down arrows.

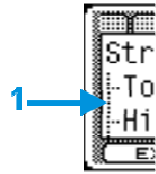
2.4.2 Dropdown



A dropdown [1] arrow appears to the right of menu items with multiple choices. To view choices, highlight the menu item using the up/down arrows then use the toggle button to expand the dropdown. Use up/down arrows to scroll and the toggle button to select/accept.

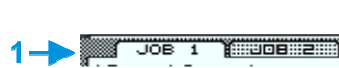
Tau Controller

2.4.3 Menu Tree



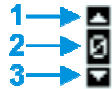
A menu tree [1] appears beside related menu items.

2.4.4 Tabs



Tabs [1] appear at the top when multiple menu selections exist. To navigate between tabs, use the left/right arrows. The active tab is white; inactive tabs are grey.

2.4.5 Character Scrollbar



This scrollbar enables adding: 0-9 and a period. The up arrow [1] and down arrow [3] direct scrolling with the active character [2] displayed between. Use the controller's up/down arrows to scroll through character choices. The left arrow backspaces. The right arrow moves one position to the right to input next character. Push toggle button to accept entry.

2.4.6 Run Display



Icons [1] identify controller events (see list below). Displays last fastening cycle torque and angle values with units [2] when a tool is connected, and shutoff codes [3]. The black box has the selected Job, the accumulated bolt count and target bolt count for the selected job. The run screen displays unless other programming functions are in use.

The display background color is white in normal operation. After an OK fastening cycle, the display background color will change to green for two seconds, then revert back to white for the next cycle. After a NOK fastening cycle, the display background color will change to red for two seconds, then revert back to white for the next cycle. The display background color will turn red in the event of a fault; see section 2.5.

Shutoff Codes on the display indicate why a tightening cycle terminated prior to completion.

Shutoff Code	Description
TIME	Tightening time exceeds programmed Cycle Abort time value
STOP	Spindle stopped by either the operator or other device
>125%	Spindle stopped due to torque achieving greater than 125% torque limit for the spindle
FAULT	Precedes a fault described in section 2.3
STALL	Spindle in stall status
CAN	Can occur during a tightening cycle when a spindle firmware update is in progress

Tau Controller Icons

Icon	Status	Description
	Locked	Password required to make changes
	Busy/working	Wait for icon to clear
	Fault, system not operable	Check the run screen for Fault message
	Force on or off	Identifies an input/output forced on or off
	Stop Tool Operation, (press trigger for indication of cause)	No Torque Target – The selected Job is not programmed to run a tool, select another Job or program the currently selected Job. Stop Issued – An Input is disabling the tool, remove the Stop input.

Reset Reject – Reset Reject is enabled and active, reset the reject by pressing the multiple function button (MFB).

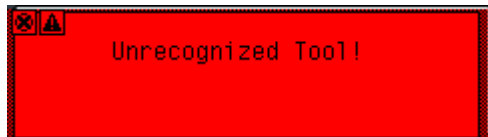
System Initializing – The controller is booting up, please wait.

Cycle Lock-out – The Cycle Lock-out timer is active, wait for the timer to finish.

Not Armed – There are two things that can cause this event:

- a) Tubenuts – By default tubenuts require arming by tapping the MFB before the trigger is pressed to run the tool.
- b) Reset Reject – The fastening cycle is NOK and the MFB mode is set to Reset Reject preventing the tool from running until the MFB is pressed to reset the NOK.

2.5 Faults



The display background color is white in normal operation. In the event of a fault, the display background becomes red and the fault description appears on screen. The background color reverts to white only when the fault is cleared.

Overcurrent Fault!	There are two things that can cause this hardware fault: <ol style="list-style-type: none">a) GFI – the Ground Fault Interrupter has exceeded its current trip point. A current detector monitors the current through the three phases of the motor and asserts this fault when the total current applied to the tool does not equal the total current returned from the tool. All phases are turned off immediately to protect the controller from shorts at the tool end.b) Total Current – the controller software limits the current applied to any tool based on what the tool can handle. This fault is asserted if there is a short at the tool end and the total current applied is greater than allowed.
Logic Voltage Fault!	The controller monitors the +5VDC, -5VDC and +12VDC of its onboard Power Supply. This fault is asserted when those voltages fall outside of nominal range.
Position Feedback Fault!	The controller is constantly monitoring the <i>resolver</i> zero and span points and asserts this fault if they go outside specification.
Transducer Span Fault!	This fault is asserted when the transducer zero point has shifted far enough to prevent a full scale reading from the transducer.
Temperature Fault!	This fault is asserted when the tool temperature detector has reached the temperature limit set by the Temperature Limit parameter. It resets after detected temperature has dropped by 5°C.
Unrecognized Tool!	The controller is communicating to the tool but does not recognize the model number written in the tool memory board.
Tool Communications!	The controller is not communicating to a tool.
Transducer Current Fault	Transducer current has fallen outside nominal values. For E series tools that is 15.74 mA +/- 75% (4.5 – 26mA). For EA series tools that is 4.16 mA +/- 75% (1 to 7mA).
Transducer Zero Fault!	The transducer zero point has shifted too far for the controller to compensate. These points are visible on the controller diagnostics screen under Analyze.
Unsupported Tool!	The wrong tool type has been connected to the controller. The Tau controller cannot run the tool that is connected.

Tau Controller

2.6 Messages

Messages appear on the screen when certain non-critical conditions exist that asserts the warning.







Tool Update Failed Controller failed to update the tool configuration.

2.7 Tau Controller Programming







WARNING	
EXCESSIVE TORQUE CONDITION	
To Avoid Injury:	
<ul style="list-style-type: none"> • Only trained and qualified personnel should program controllers. • Never set control limits above the maximum rating of the tool. • Setting control limits above the maximum rating of the tool can cause high reaction torque. • Always test for proper tool operation after programming the controller. 	


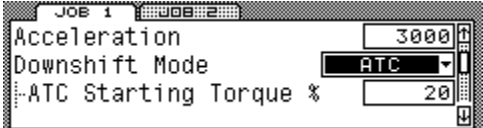

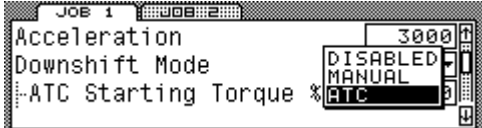
Six keypad buttons enable information display and programming:

Button	Description
	Job Use to program tool strategy such as torque parameters, thread direction, minimum angle limits and abort time.
	Tool Use to modify parameters for tool multi-function button (MFB), headlights and Preventive Maintenance counter functions.
	Speed Use to program tool speed for free runs and downshifts.
	I/O Use to set parameters for input and output (I/O) functions.
	Information Use to get information about the tool and controller firmware version and language selection.
	Diagnostic Use to diagnose and force the I/O functions.

To begin programming a tool strategy, press one of the keypad buttons.

Icon Legend	Icon Description	Navigation
	Keypad Buttons	Press to activate function assigned to button.
	Left/Right Arrow Keys	Navigate tabs as well as backspace and space.
	Up/Down Arrow Keys	Scroll through menu, number and character selection.
	Toggle Button	Selects option for data input, accepts changes.

The left column shows the currently defined Tau Controller settings and menu choices. The Options Screen column shows options for each selection. Screen navigation options appear above each screen.

Default Screens	Options Screen
 	 





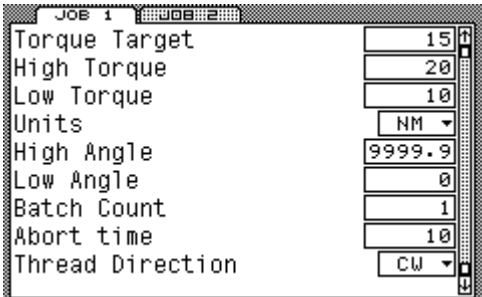



NOTE:
Programming changes are stored after exiting current menu and returning to run screen.

2.7.1 Keypad Buttons

2.7.1.1 Job

Job programs the torque window for the tool strategy and controls tool operation for tightening a fastener with one TC/AM (Torque Control, Angle Monitoring) Step. A Job is required to run a tool strategy. Inputs or the tool MFB are used to select specific Jobs with different tool strategies. Program Job parameters according to the integration and tool strategy desired. The Tau can have a maximum of two Jobs.

Job Screens	Options Screens
	Select by pressing the Job button on the keypad.
	 Use the left/right arrow keys to select a job for programming.
 	 Torque Target – The torque at which the controller shuts off the tool (required for this step). Should be greater than Low Torque and lower than High Torque. High Torque – The maximum peak torque for an acceptable tightening cycle, required. If the actual torque exceeds this limit, the tightening cycle will be flagged as NOK and the red LED on the front panel and tool illuminates. Value must be greater than Torque Target, but less than or equal to the rated torque marked on the tool.

Low Torque – The minimum peak torque for an acceptable tightening cycle (required). If the actual torque does not reach this limit, the tightening cycle is flagged as NOK and the yellow LED on the front panel and tool illuminates. Value must be less than the Torque Target.

Units – Operating torque units include:

NM, Newton Meters

Tau Controller

Job Screens

Options Screens

FTLB, Foot Pounds
INLB, Inch Pounds
INOZ, Inch Ounces
KGM, Kilogram Meters
KGCM, Kilogram Centimeters
NCM, Newton Centimeters

Each Job does not have to use the same operating torque units as other Jobs.

High Angle – The maximum peak angle for an acceptable tightening cycle (required for all steps). If the actual angle exceeds this limit the tightening cycle will be flagged as NOK and the RED LED on the front panel and tool illuminates. Must be greater than Low Angle. Units are degrees of rotation.

Low Angle – The minimum peak angle for an acceptable tightening cycle. If the actual angle does not reach this limit the tightening cycle will be flagged as a NOK and the YELLOW LED on the front panel and tool illuminates. Must be less than High Angle. Units are degrees of rotation.

Batch Count - This is the number of fasteners the Job is required to count. Zero is not allowed. The maximum is 99.

Abort Timer – Stops the tool when the time has elapsed from the start of the step. Required for this step. The value should be long enough to complete the tightening cycle during this step.

Thread Direction – Tighten a right hand fastener with CW (clockwise) and use CCW (counter-clockwise) for left hand fasteners.

Preset Parameters (Non-editable)

(Threshold Torque) – The torque level during the tightening cycle when the In Cycle Output transitions high. Automatically set to 20% of Target Torque.

(Snug Torque) – The point in this step when the controller begins to monitor the tool's output angle. Automatically set to 50% of Target Torque.



Press a keypad button to save changes and return to the Run screen.


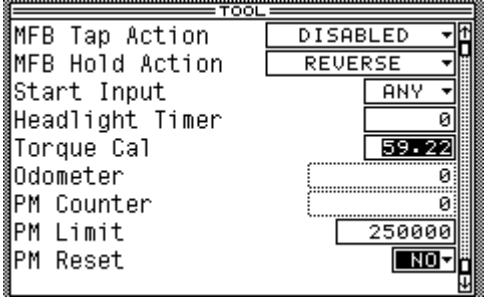



Save Changes – select this option to save the recent changes

Abandon Changes – select this option to delete the recent changes.

2.7.1.2 Tool

Tool programs the tool functions. The Torque Cal, PM Limit and PM Reset values modifications are saved to the tool not the controller.

Tool Screens	Options Screen
	<p>Press the Tool button on the keypad to select.</p>
	 <p>See Section 3.4.2 for an explanation of these MFB action modes.</p> <p>MFB Tap Action – Identifies the action performed when the operator presses the MFB briefly.</p> <p>MFB Hold Action – Identifies the action performed when the operator presses the MFB for one second.</p>

Start Input – This parameter defines which input will be used to start the tool. In all cases, the 24 VDC Start input is available to start the tool.



Any – Any input will start the tool. The available inputs are from the tool trigger, a 24 V input or the push-to-start (PTS) switch on the tool.

All – The tool trigger and the PTS switch must be activated in order to start the tool.

Lever – Only the trigger on the tool can start the tool.

PTS – Only the push-to-start switch on the tool can start the tool.

None – Neither the tool trigger nor the tool push-to-start switch can start the tool.


Headlight Timer - Sets the time the pistol tool headlights remain on, in seconds, after the trigger is pressed.

Torque Cal – This is the specific torque calibration value for the tool. Enter a new value after performing a lab certification. The Torque Cal should not deviate from the Nominal Cal value by more than 20%.

Odometer – Cannot be reset. Indicates the total number of OK tightening cycles the attached tool has performed over its lifetime.

PM Counter – Causes the preventive maintenance LED to illuminate (on front panel and tool) when this value exceeds the PM Limit.

PM Limit – When the PM Counter in the tool exceeds this threshold, the preventive maintenance LED on the front panel illuminates indicating it is time to perform maintenance on the attached tool.

PM Reset – Select YES to reset the PM Counter back to zero. 



Press a keypad button to save changes and return to the Run screen.




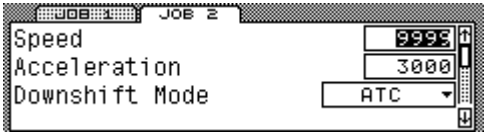

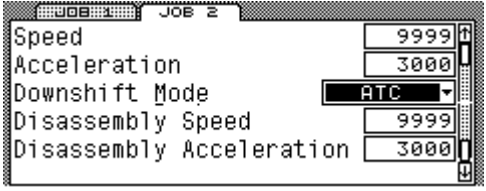

Tau Controller

Save Changes – select this option to save the recent changes

Abandon Changes – select this option to delete the recent changes.

2.7.1.3 Speed

Speed programs the tool's free running and downshift speeds functions.

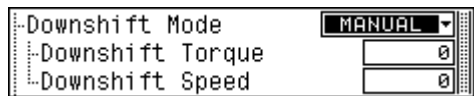
Speed Screens	Options Screens
	Press the Speed button on the keypad to select.
	 Use the left or right arrow keys to select a job to program.
	 <p>Speed – The velocity of the output of the tool before any Downshift Mode activates. Units are RPM. Required to run the tool. Must be greater than 0.</p> <p>Acceleration - The rate the tool achieves Speed in RPM/s (revolutions per minute per second) required to run the tool. The rate should be greater than 1000 RPM/s.</p>

Downshift Mode – Selects the type of spindle inertia control toward the end of a fastening cycle.

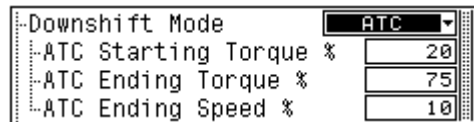


Disabled – Does not reduce the speed of the motor.

Manual – Reduces the tool speed to a specific value (Downshift Speed) when a specific torque value (Downshift Torque) is achieved during the fastening cycle. Speed units are RPM, Torque is in torque units.



ATC – Enables the Adaptive Tightening Control algorithm to slow the tool speed as the torque rises.



The default values can be modified for when the algorithm starts (ATC Starting Torque), when it ends (ATC Ending Torque) and what the tool speed is after the algorithm ends (ATC Ending Speed). The torque units are percent of Target Torque. The speed values are percent of Speed.

Disassembly Speed – The speed of the tool during Reverse operation in RPM (revolutions per minute).

Disassembly Acceleration – The rate the tool achieves Disassembly Speed in RPM/s (revolutions per minute per second).

Preset Parameters (Non-editable)

(Soft Stop) – This controls how the tool is turned off AFTER reaching target torque. This is designed as an ergonomic benefit to ease operator discomfort with direct-drive tools. The tools

current will be removed for five msec, reapplied for 25 msec, then it will ramp to zero over 75 msec.

(Power) – The maximum power available to the tool to perform the tightening. Permanently set at 100 percent of maximum rated torque of the tool.



Press a keypad button to save changes and return to the Run screen.


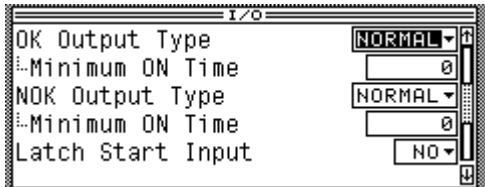



Save Changes – select this option to save the recent changes

Abandon Changes – select this option to delete the recent changes.

2.7.1.4 Inputs and Outputs (I/O)

I/O programs the Input and Output functions of the controller. A complete list of available I/O elements and their descriptions is available in Section 4.2.




I/O Screens	Options Screen
	<p>Press the <i>I/O</i> button on the keypad to select.</p>
	 <p>See Section 4.2.2 for a description of the OK/NOK Output Type parameters.</p> <p>See Section 4.2.1 for a description of the Latch Start Input parameter.</p>



Press a keypad button to save changes and return to the Run screen.

2.7.2 Information

Information displays data about the controller and tool and enables language selection.

Information Screens	Options Screen
	<p>Press the <i>Information</i> button on the keypad to select.</p>
	 <p>Language – selects the language for the controller.</p> <p>Default Controller – select <i>YES</i> to set controller parameters to factory default, select <i>NO</i> to continue using programmed parameters.</p> <p>Controller Software – displays the firmware version of the controller.</p> <p>Tool Software – displays the firmware version of the tool currently connected to the controller.</p>

Tau Controller



Press a keypad button to save changes and return to the Run screen.


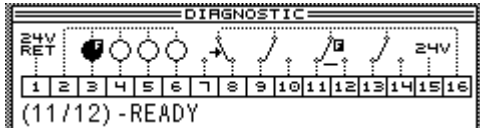



Save Changes – select this option to save the recent changes

Abandon Changes – select this option to delete the recent changes.

2.7.3 Diagnostics

Diganostics displays controller I/O status and allows forcing.

Diagnostics Screens	Options Screen
	<p>Press the Diagnostics button on the keypad to select.</p>
	 <p>This screen indicates the real time status of the 24VDC Inputs and Outputs. Forcing the I/O on or off is also performed here.</p>

Each pin, of the 24VDC connector, is represented and has permanent assignments, see list below. Pins 3 through 6 are for Inputs. Pins 7 through 14 are for Outputs. See section 2.7.1.4 to configure the I/O. See section 4.1.4 for a schematic. See Section 4.2 for the definitions of the I/O elements.

Pin 1 - 24VDC Return to complete the current loop; connects to chassis ground.

Pin 2 - for supplying the Inputs with 24 V for Sourcing Inputs or 24 V Return for Sinking Inputs.

Pin 3 –START

Pin 4 - STOP

Pin 5 - REVERSE

Pin 6 - JOB SELECTED BIT 0

Pin 7 – JOB COMPLETE, N.C.

Pin 8 – JOB COMPLETE, N.O.

Pin 9 - CYCLE NOK, N.C.

Pin 10 - CYCLE NOK, N.O.

Pin 11 – NOT FAULTED, N.C.

Pin 12 – NOT FAULTED, N.O.

Pin 13 - IN CYCLE, N.C.

Pin 14 –IN CYCLE, N.O.

Pin 15 - 24VDC supplied by internal power supply

Pin 16 – for supplying the Outputs with 24 V for Sourcing Outputs or 24 V Return for Sinking Outputs.

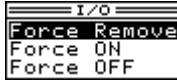
If an Input pin icon is Clear, it is OFF. If the pin icon is Dark, the pin is ON. If an output has an arrow moving it to the Normally Open pin it is ON.

There is a horizontal cursor under the pins. Use the left or right keys to move the cursor. The bottom left corner of the screen indicates cursor location and the pin's assigned element.

Manually control the I/O by forcing elements either ON or OFF. Applying a force means the pin will always be in that forced state and does not toggle to the opposite state (even if the system requires it to toggle). This is useful for troubleshooting signals that integrate with other

equipment.

Use the horizontal cursor under the pins to select the pin to be forced. Press the toggle button to bring up the force menu.



Use the up or down arrows to choose the force required then press the toggle button again to execute the selected force. When the force is no longer required, use the Force Remove selection to remove the force and return the pin to system control.

If an Input pin icon is Clear, or the Output pin has no arrow with a small 'F' icon, that means it is forced OFF. If the Input pin icon is Dark, or the Output pin has an arrow with a small 'F' icon, this means the pin is forced ON.

If a force is active when one of the keypad buttons is pressed to exit the Diagnostics Screen, the force will remain active. Enter the Diagnostics Screen again to remove the force.



Press a keypad button to return to the Run screen.

2.7.4 Password Protection

The Tau controller can be locked and unlocked to protect the programming from inadvertent changes. When locked, the lock icon appears in the upper left corner of the controller. When unlocked, the icon disappears.

Password Screen	Options Screen
	<p>Press the toggle button on the keypad twice to select the Password screen.</p>
	<p>Press <u>any</u> sequence of <u>any</u> four keys to create the password. The exact sequence of keys pressed is the password. For Example: pressing Up, Down, Left, Right creates a password of Up, Down, Left, Right.</p>

After all four spaces are assigned a new window pops up to give the user a chance to abort the locking procedure.

Lock the Controller – Choose this option and press the toggle key to use the entered password to lock the controller.

Leave Controller Unlocked – Choose this option and press the toggle key to abort entering a password and keep the controller unlocked.

To unlock the controller, press the toggle button twice, then the exact sequence of keys pressed to create the password. Pressing the incorrect keys, opens the run screen with the lock icon still engaged. The correct password is required to unlock the controller.

Using the example above, to unlock: Press the Toggle button twice, then Up, Down, Left, Right.

QPM DC Electric Tools

This chapter is intended to promote proper and safe use and give guidance to owners, employers, supervisors and others responsible for training and safe use by operators. DC Electric tools from **STANLEY ASSEMBLY TECHNOLOGIES** are intended for use in industrial threaded fastening or precision position and or adjustment applications only. Some instructions may not apply to all tools. Please contact your Stanley Sales Engineer for information or assistance on Stanley training for assembly tool operation.

3.1 Tool Specifications

Operating Conditions	Temperature	32 to 122 °F (0 to +50 °C)
	Humidity	0 to 95 % non-condensing

Noise Level: A-weighted emission sound pressure level at the work station < 70dBA (ref 20μPa) as determined according to ISO 15744-2002.

Vibration Level: Weighted root mean square acceleration value at the handle < 2.5 m/s² as determined according to ISO 8662.

STANLEY ASSEMBLY TECHNOLOGIES hereby declares the following sound and vibration emission levels as required by the Machinery Directive 98/37/EC.

Product	A-weighted emission sound pressure level at the work station L_{pA} (ref 20μPa). Value determined according to ISO 15744-2002 * using as basic standards ISO 3744 and ISO 11203	Weighted emission root mean square acceleration level at the handle. Value determined according to ISO 8662 * (single axis)
EC0, EC1, EC2, EC3, EC4 and EC5 electric tools	< 70dBA	< 2.5 m/s ²

* Operating conditions for all measurements: full rated speed, no load, rated supply voltage or pressure.

A-weighted emission sound power level L_{WA} : not required, declared sound pressure emission levels are below 85dBA.

C-weighted peak emission sound pressure level L_{pCpeak} : not applicable to these products.

Uncertainty K_{pA} , K_{WA} , K_{pCpeak} : not relevant, declared levels are maximum values.



WARNING

To Avoid Injury:

This information is provided to assist in making rough estimates of sound and vibration exposure levels in the workplace. The declared emission values were obtained by laboratory type testing in accordance with the stated standards. **Levels measured in individual workplaces may be higher.**

The actual exposure levels and risk of harm experienced by an individual user depends upon the work piece, workstation design, duration of exposure, and the physical condition and work habits of the user. To help prevent physical impairment, a program of health surveillance is highly recommended to detect early symptoms which may relate to sound and/or vibration exposure, such that appropriate preventive measures may be taken.

3.2 Operator Protection



WARNING

ROTATING EQUIPMENT

To Avoid Injury:

- Always wear eye and foot protection when operating, installing, or maintaining power tools, and when in areas where power tools are being used, maintained, or installed. Some applications may require the use of safety glasses and face shields. Use eye protection that conforms to ANSI Z87.1.[3] and ANSI Z41-PT99M I/75 C/75.
- Always stay alert when operating tools and/or their accessories. Do not operate tools and/or their accessories while tired, under the influence of drugs, alcohol or any other mind-altering substance.
- Repetitive work motions or vibration may be harmful to your hands, arms, shoulders or back.
- Use suitable protective equipment and work methods whenever an application presents a hazard.

3.2.1 Repetitive Motion

The use of power tools may involve highly repetitive motions of the fingers, hands, wrists, and shoulders. These repetitive motions can lead to cumulative trauma disorders (CTD). Many personal and workplace factors can contribute to these disorders.

Currently available data have identified the following risk factors. These risk factors are not necessarily causation factors of CTDs. The mere presence of a risk factor does not necessarily mean there is excessive risk of injury. Generally, the greater the exposure to a single risk factor or combination of factors the greater the risk for CTDs.

- Forceful exertions and motions
- Extreme postures and motions
- Repetitive exertions and motions
- Intended duration of exertion, postures, motions, vibration, and cold
- Insufficient rest or pauses
- Work organization risk factors
- Environmental risk factors

These risk factors span job design and content, operator training, work method, work pace, work environment, proper tool selection and other work place factors beyond the control of the tool manufacturer. Tool owners and employers should analyze jobs for all of the risk factors identified above and take appropriate action.

Some measures which may reduce the risk of CTDs:

- Use minimum hand grip force consistent with proper control and safe operation.
- Keep wrists as straight as possible.
- Avoid repetitive movements of the hands and wrists.
- If wrist pain, hand tingling, numbness, or other disorders of the shoulders, arm, wrist or finger occur; notify supervisor, discontinue operation, reassign user to a different job; if relief is not found contact experts skilled in treating such disorders.

Wrist supports, torque reaction devices, and balancers should be used if it can be determined that such devices can reduce the risk of repetitive motion disorders.

3.2.2 Hearing Protection

Power tool operators and adjacent personnel may be exposed to excessive sound levels. The tool in use is generally only one of many sources of noise that an operator experiences. Other tools and machines in the area, joint assembly noise, work processes, and other ambient noise sources all contribute to the sound level operators are exposed to.

The actual sound level an individual is exposed to and the individual's exposure time over the work day are important factors in determining hearing protection requirements. Worker sound level exposure can only be determined at the job site and is the responsibility of tool owners and employers.

Tau Controller

Measure worker sound level exposure and identify high-risk noise areas where hearing protection is required.

Follow federal (OSHA), state or local sound level statues, ordinances and or regulations.

3.2.3 Vibration

Power tools can vibrate during use. To minimize the possible effects of vibration:

- Keep hands and body dry.
- Avoid anything that inhibits blood circulation such as tobacco, cold temperatures and certain drugs.
- Operators should notify their employer when experiencing prolonged symptoms of pain, tingling, numbness or blanching of the fingers.
- Wear vibration damping gloves if it can be determined that they reduce the risk of vibration disorders without introducing other hazards.

3.2.4 Breathing Protection

Respirators shall be used where contaminants in the work area present a hazard.

3.3 Tool Installation



WARNING

To Avoid Injury:

- Always wear eye and foot protection when installing equipment.
- Only use equipment and accessories specifically designed to operate with Stanley assembly tools and use them only in the manner for which they are intended.
- Do not install worn, damaged, or modified equipment that may be unsuitable for safe use.
- Train all operators in the safe and proper use of power tools. Operators should report any unsafe condition.
- Store idle tools and accessories in a safe location accessible only by trained persons.
- Disconnect power source (air, electricity, etc.) from tool prior to making adjustments, changing accessories, or storing.
- Prior to operation, always check and test tools and accessories for damage, misalignment, binding or any other condition that may affect operation. Maintenance and repair should be performed by qualified personnel.
- Do not operate tools in or near explosive environments or in the presence of flammable liquids, gases, dust, rain or other wet conditions.
- Keep the work area clean, well lit and uncluttered.
- Keep unauthorized personnel out of the work area.

DC Electric Tools & Controllers:

- Install tools in dry, indoor, non-flammable, and non-explosive environments only – Humidity: 0 to 95% non-condensing and Temperature: 32 to 122 °F (0 to +50 °C).
- Installation, maintenance and programming should be performed by qualified personnel. Follow all manufacturer installation instructions and applicable regulatory electrical codes and safety codes.
- Tool and controller plugs must match the outlet. This equipment must be earth grounded. Never modify a plug in any way or use any adaptor plugs.
- Avoid body contact with electrically energized surfaces when holding a grounded tool.
- Prior to connecting a power source, always ensure the tool or controller is turned off.
- Limit controller access to trained and qualified personnel. Lock controller cabinets.

Turn controllers off when attaching tools.

Stanley electric tools must be connected to a controller to operate. To ensure superior performance and safe operation, use a Stanley controller specifically designed for each tool. These instructions are specific to Stanley Electric Tools when used with Stanley Electric Tool Controllers and accessories. Some features may not be applicable, performance may be degraded and some safety systems may not be available when tools are connected to non-Stanley controllers and accessories.

3.3.1 Sockets and Adapters

Use only industrial grade sockets and adapters (power bit and power or impact socket type).

Replace worn or damaged sockets that are unsuitable for safe operation immediately.

Always ensure drive socket is fully seated and locked into position before connecting power to tool.

3.3.2 Suspension Devices

Tool suspension devices or bails help support the weight of the tool during tightening operations. Attach these devices securely and periodically inspect them for damage or loosening.

3.3.3 Cable Installation



WARNING

ELECTRICAL HAZARD
To Avoid Injury:

- Never use a tool with a damaged cable.
- Never abuse a cable, carry a tool by its cable, hang a tool by its cable, or pull on a cable to disconnect it from the tool or the controller.

To ensure superior performance and safe operation, use the Stanley cables specifically designed to operate these tools.

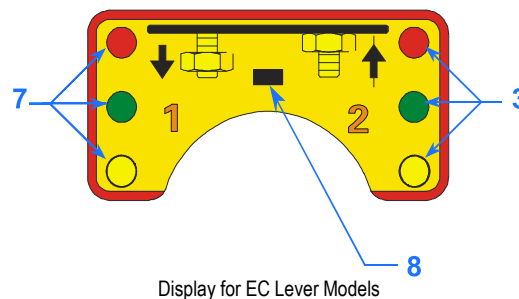
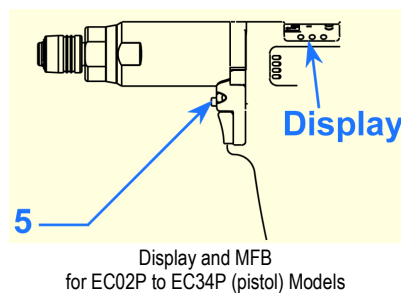
Never use a tool with a damaged cable. Never abuse a cable, carry a tool by its cable or pull a cable to disconnect it. Also, keep the cord away from heat, sharp edges, or moving parts.

Use cables of appropriate length (60M maximum) for each application; position and or suspend them in such a way as to prevent tripping and cable damage, and to provide good work area maneuverability.

3.4 QPM Tools

3.4.1 Display and MFB for Hand Held Tools

Handheld QPM tools have a display and a multiple function button (MFB). Two sets of lights [3 and 7] indicate tightening cycle status. Two blue lights indicate tool rotation direction, disassembly [1] or assembly [2]. A single multiple function button [5] can change tool direction and or parameter sets. When the button is used to select the Job, one of two orange indicators [4 or 6] illuminates to show the active Job. EC tools have four sets of lights [3 and 7] and an LED [8] indicates when the tightening cycle count exceeds the PM limit. The tool also has an audible device to aid operator.



3.4.2 MFB Mode

The *MFB Mode* configures the multiple function button for handheld QPM tools. The button can be configured to operate-in any of the following modes: These functions can be assigned to a tapping or holding (for one second) operation.

- | | |
|--------------------------|--|
| Disable
(default) | The button does nothing. Pressing the button causes the tool alarm to "beep" once. Only the assembly blue light [2] illuminates. |
| Reverse
(Disassembly) | Pressing the button toggles between assembly and disassembly and illuminates the appropriate blue light [1] or [2]. All tool status lights, [3] and [7], flash when the tool is in disassembly mode. |
| Job Select | Pressing the button toggles between Job 1 and Job 2 and illuminates the appropriate orange light [6] or [4]. |

Tau Controller

- Arm** Pressing the button arms (activates) the trigger but does not start the tool. The blue assembly light [2] comes on to show that the tool is armed.
- Reset Reject** This function, when selected, will cause the tool to disable after a NOK tightening cycle. The Reject Tone, when enabled, will sound continuously. Pressing the button re-enables the tool and stops the reject tone indicating the operator acknowledges the rejected tightening cycle and wishes to repair it.

3.4.3 Tool Memory

QPM tools have an onboard tool memory that stores tool identification, calibration factors and tightening cycle counters. Memory parameters include:

- *Model Number*
- *Serial Number*
- *Torque Cal* (calibration) factor
- *Angle Cal* (calibration) factor
- Tightening cycle counters

3.4.4 Tightening Cycle Counters

QPM tools have onboard counters that record the number of tightening cycles completed by the tool.

- *Odometer Counter.* Records the total number of tightening cycle completed.
- *PM Counter.* Records the number of tightening cycles completed since the last time it was reset.
- *PM Threshold.* A static value set by the end user. When the PM Counter exceeds the PM Threshold (Limit), the controller provides a maintenance alert. The alert is an orange LED on the front panel and the tool.

The controller reads the tightening cycle counters from the tool on each power up.

3.5 Tool Operation



WARNING

ROTATING SPINDLE

To Avoid Injury:

- Always wear eye and foot protection when operating and when in areas where power tools are being used.
- Keep all body parts and clothing away from the rotating end of the tool. Dress properly. Do not wear loose-fitted clothing or jewelry.

TORQUE REACTION FORCE

To Avoid Injury:

- Be alert and maintain good balance, footing, and posture at all times in anticipation of the tool's torque reaction. Do not over-extend or over-reach.
- Be prepared for the change in direction and or a higher reaction force when a tool is in reverse.
- The start lever should be positioned to avoid trapping the operator's hand between the tool and the work piece.

TOOL MAY NOT SHUT OFF

To Avoid Injury:

- If the tool does not shut off at the end of the tightening cycle, contact the person responsible for tool installation or repair. Note: When the tool does not shut off, a stall condition occurs. A stall condition can cause a higher than expected torque reaction impulse.
- Ensure tool is properly installed, adjusted and in good working order.
- Do not use the power tool if the switch does not turn it on and off.
- Apply the tool to the joint following all recommendations in this manual.
- Check to ensure the drive socket is fully seated and locked into position before connecting power to the tool.

Prepare to resist the tool's torque reaction:

Start the tool by depressing the start lever or trigger.

Release start lever after the cycle is complete.

3.5.1 Directional Control



WARNING

UNEXPECTED REACTION FORCES

To Avoid Injury:

- Be prepared – when a tool operates in reverse, the tool's torque reaction is opposite to the reaction produced when the tool operates in forward direction.
- The tool can have a higher initial reaction force when loosening a fastener.
- Always stop the tool before changing direction of spindle rotation.

3.5.2 Torque Reaction Devices



WARNING

PINCH POINT BETWEEN TORQUE REACTION BAR AND WORK PIECE

To Avoid Injury:

- Never place any body part between a reaction bar and the work piece.
- Before starting the tool, position the reaction bar firmly against a stationary rigid member that is opposite to the spindle rotation.

Torque reaction devices absorb tool torque reaction forces. Always use reaction devices when high reaction force could injure an operator.

Some reaction devices may require modification to fit the application. Follow all appropriate installation instructions.

3.5.3 Tool Temperature



WARNING

POTENTIAL BURN HAZARD

Fixtured tools have higher operating temperatures and do not have additional thermal protection.

To Avoid Injury:

Wear thermal protective gloves when handling fixtured tools.

Stanley electric tools are thermally protected to prevent damage due to overheating. The thermal protection does not allow the tool to operate if the tool temperature rises abnormally – the thermal protector resets automatically when the tool cools down.

Controller parameter settings can have a significant effect on tool operating temperatures.

3.5.4 Tool Status Lights

Handheld tools from **STANLEY ASSEMBLY TECHNOLOGIES** have three (green, yellow, and red) status lights. The status light mirror or copy the status lights on the controller or control panel.

Green	Tightened to specified limits	The tightening cycle meets all of the specified parameters.
Yellow	Low torque or angle	The tightening cycle was rejected for not achieving either low torque or low angle.
Red	High torque or angle	The tightening cycle was rejected for exceeding either high torque or high angle.
All lights	Reverse	The next time the start trigger is engaged the tool will remove the fastener.

3.5.5 Tool Audible Device

The tool also has an audible device to aid operator. The Tau controller pulses the audible device when the tool is in the Reverse direction. There is no audible indication of OK or NOK tightening cycles.

Tau Controller

3.5.6 Setting Torque, Angle and Other Operating Parameters



WARNING

EXCESSIVE TORQUE CONDITION

To Avoid Injury:

- Only trained and qualified personnel should program controllers.
- Never set control limits above the maximum rating of the tool.
- Setting control limits above the maximum rating of the tool can cause high reaction torque.
- Always test for proper tool operation after programming the controller.

The Tau controller can be setup to change tightening Jobs from the tool (see 2.7.1.2 Tool).

3.6 Special Application Tools

3.6.1 Exposed Gear Socket Tools



WARNING

PINCH POINT AT THE EXPOSED GEARS OR TEETH

To Avoid Injury:

Keep body parts and clothing away from the exposed gear sockets. Dress properly. Do not wear loose-fitted clothing or jewelry.

Exposed gear socket tools are designed to fit into tight spaces where other tools do not fit. These tools have exposed gears or ratchet teeth.

3.6.2 Tubenut Nutrunners



WARNING

PINCH POINT AT THE EXPOSED GEARS OR TEETH

To Avoid Injury:

- Never place body parts or clothing, near the socket opening. Dress properly. Do not wear loose-fitted clothing or jewelry.
- Follow the Tubenut Nutrunner Sequence of Operation

Tubenut nutrunners are used for installing tube fittings.

Tubenut Sequence of Operation (QPM Tools)

- Place nutrunner socket on fastener
- Press the MFB to “arm” the start function
- Depress start lever, the tool will run the selected Job.
- The tool stops after reaching torque
- Release the lever and lift the tool from the fastener, all tool status lights flash to indicate the tool will now run in reverse to open the socket
- Depress the start lever until the socket returns to the open position
- Release the lever
- Remove the tool

Tau Controller Connections

Each Tau Controller has a different combination of connectors. These connectors serve several purposes, such as:

- Power
- Tool Connections
- Discrete inputs and outputs



CAUTION

POTENTIAL ELECTROSTATIC DISCHARGE HAZARD AND WATER AND DIRT INGESTION To Avoid Damage:

If not using a connector, keep the connector securely covered with the provided cap. This reduces the opportunity for transfer of static electricity and prevents dirt and water from entering the controller.

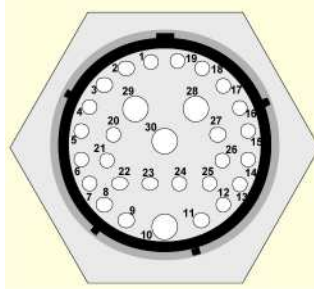
4.1 Tau Controller Connections

4.1.1 Tau Controller Power Cord

Tau Controllers use an IEC 60320 style connector. The power source connector for the power cord is based on customer requirements. The power cord should be rated at either 15A/125V for 115 V or 10A/250V for 230 V use of the controller.

4.1.2 Tau Controller Tool Connector

Tau controllers use a single 30 pin connector to connect the EC series QPM DC electric tool cables. QPM EC DC electric tool cables use a MIL-C-38999 Series III connector. The connector is a 17-30S with the insert having a B clocking position (30-pin Tool Connector).

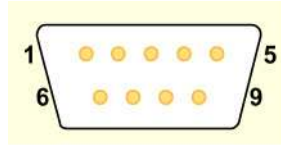


30-pin Tool Connector

Tau Controller

4.1.3 Tau Controller Serial Connector

Tau Controllers have one male DB-9 connector. COM port 1 allows a connection to a laptop computer for service related items such as firmware upgrades of the tool or controller and tool configuration changes. The connection between the computer and the controller is a simple null-modem cable. Only pins 2, 3 and 5 are active on this connector.



DB-9 Connector Pins

Pin	Function
2	Receive Data
3	Transmit Data
5	Signal Ground

4.1.4 Tau Controller Input and Output Connector

All four inputs and four outputs are optically isolated 24VDC. The Tau has an internal 24VDC power supply that can be used to provide the I/O signals; an external 24VDC power supply may be used instead. The following are the amperage ratings:

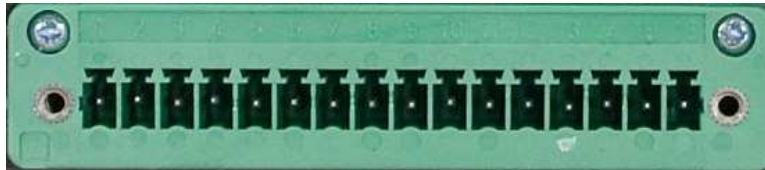
- Internal 24VDC supply: Maximum = 1 ampere total
- External 24VDC supply: Maximum = 1 ampere per output

The Tau controller's Input circuits conform to the IEC 61131-2 standard for PLCs.

LIMITS per IEC 61131-2

Rated Voltage	Type Of Limit	Type 2 limits					
		State 0		Transition		State 1	
		V low (v)	I low (ma)	V trans (v)	I trans (ma)	V high (v)	I high (ma)
24 volt	Max	5	30	11	30	30	30
	Min	-3	ND	5	2	11	6

The Tau controller has a terminal block connector for plant integration. The Tau supports various plant integration schemes such as Poke-Yoke (Error-Proofing), Job selection and remote operation of spindles.



NOTE:

One I/O mating connector (P/N 21C104806) is included with each Tau controller.

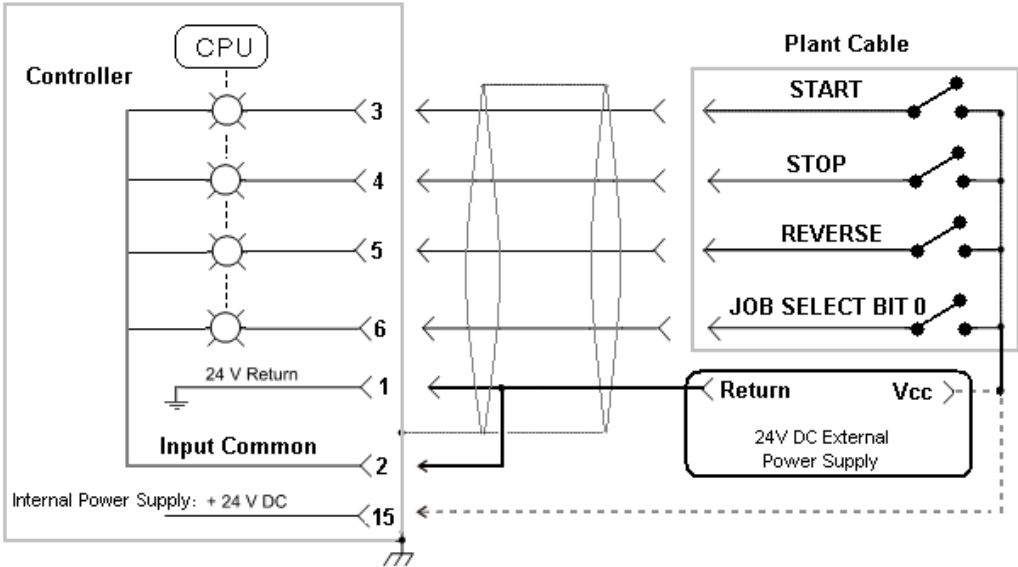
When the Tau controller is used with fixtured tools, it must use a Remote Start/Stop/Reverse pendant to the controller to provide basic switching control for the tool.

The table below shows the I/O pin description for the Tau controller.

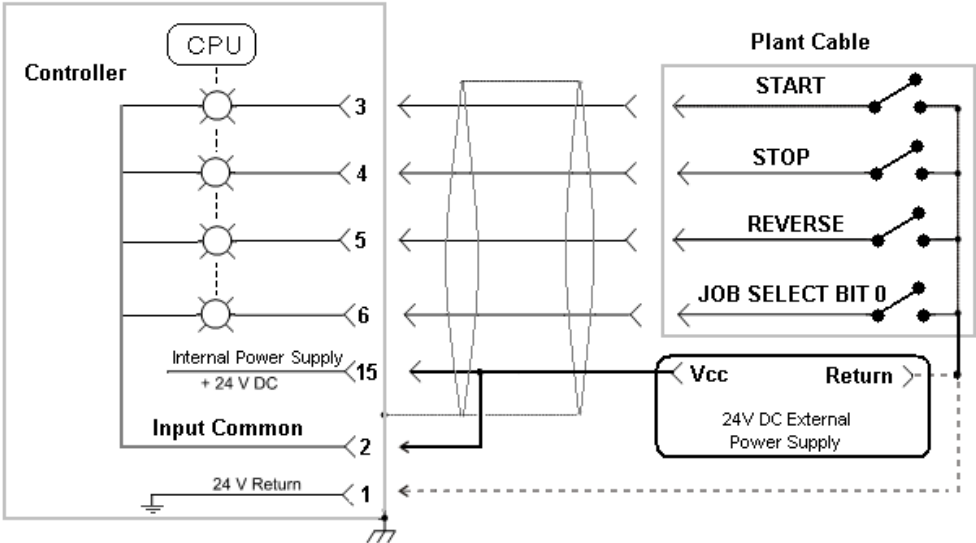
Pin	Description
1	24V Return
2	Input Common Bus
3	Input 0
4	Input 1
5	Input 2
6	Input 3
7	Output 0 N.C.
8	Output 0 N.O.

Pin	Description
9	Output 1 N.C.
10	Output 1 N.O.
11	Output 2 N.C.
12	Output 2 N.O.
13	Output 3 N.C.
14	Output 3 N.O.
15	+24 V Supply
16	Output Common Bus

Inputs: Sinking

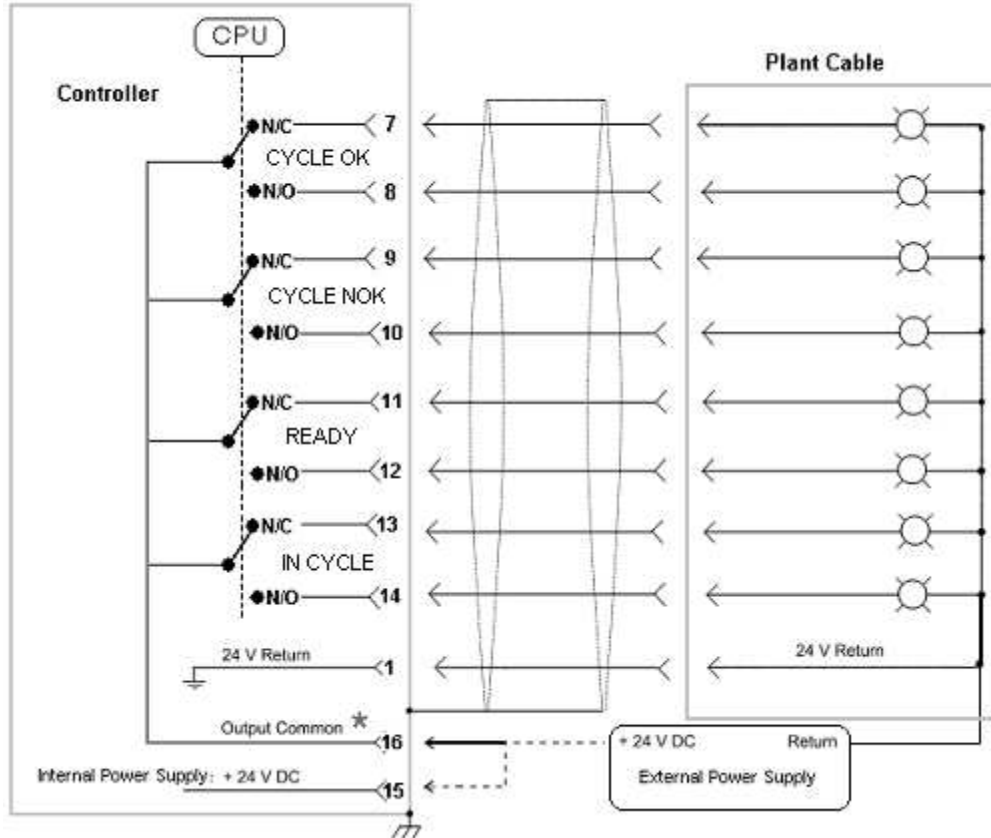


Inputs: Sourcing

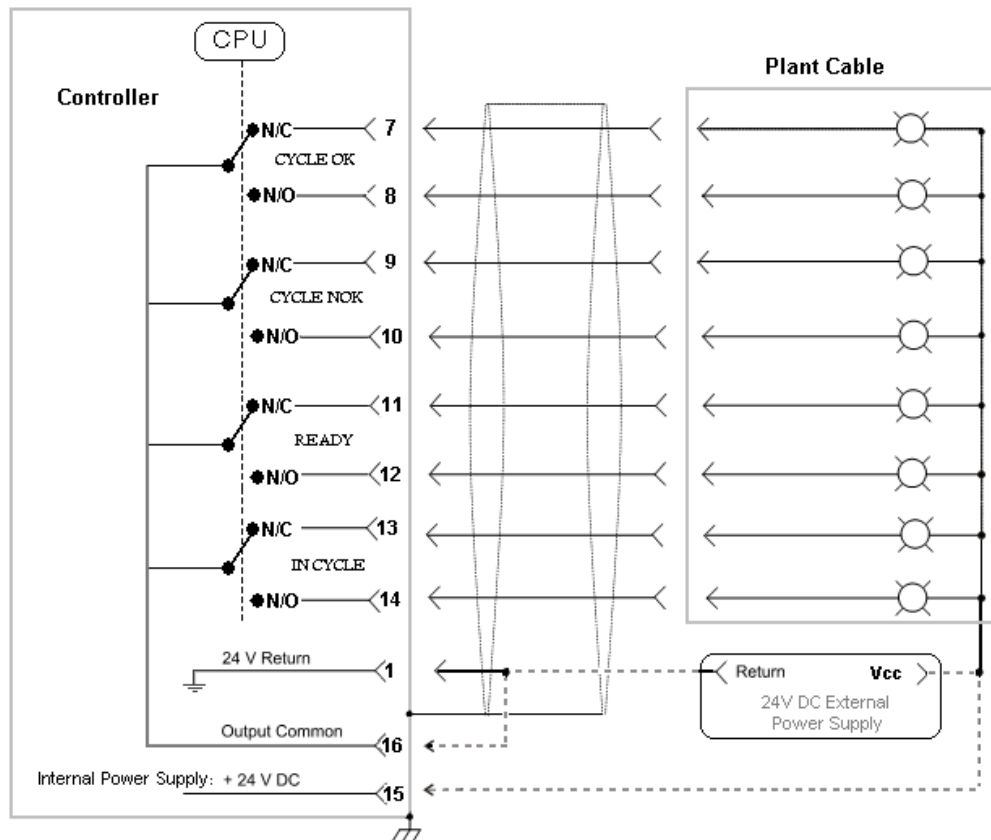


Tau Controller

Outputs: Sourcing



Outputs: Sinking



4.2 Input/Output Functions

The following Input/Output (I/O) functions apply to the 24 VDC I/O connector. There is a maximum of four inputs and four outputs.

The controller responds to the rising and falling edges of input functions as they are asserted or removed, not while the levels are high or low. The STOP bit is an exception: it is a true OR function and does not work off the transition.

The table below lists the available input and output functions, gives a brief description and indicates the configuration options for each. The configuration options are an important aspect of the I/O functions as they add multiple dimensions to some functions. These new dimensions allow integration of these controllers in unique ways and provide some flexibility.

A full description of each function appears in Section 4.2.1.

Inputs	Description	Configuration Options
START	Starts the tool	Latch
STOP	Stops the tool	None
JOB SELECT BIT	One bit in a series to select the Job	None
REVERSE	Puts the tool in reverse mode	None

Outputs	Description	Configuration Options
IN CYCLE	The tool is in cycle	Contact Type
CYCLE OK	Tightening cycle was OK	Contact Type
CYCLE NOK	Tightening cycle was NOK	Contact Type
READY	The tool is ready to run	Contact Type

4.2.1 Input Descriptions

Sourcing Inputs (NPN type)

If Pin-15 is wired to Pin-2 to supply the inputs, then a connection to the 24 V Return must be applied to assert the input. The return from the load must be wired to Pin-1.

Sinking Inputs (PNP type)

If Pin-1 is wired to Pin-2 to supply the inputs, then a connection to 24 V must be applied to assert the input. The return from the load must be wired to Pin-15.

Inputs	Description
START	<p>When asserted, the tool will start and run the currently selected job. This input is overridden by the STOP input. If STOP is used and a tool restart is required, remove the STOP, remove the START, then re-assert the START. If the tool is required to operate in Disassembly mode, remove the START, assert the REVERSE input, and then re-assert the START.</p> <p>When removed, the tool stops unless the LATCH time has been exceeded.</p> <p>Configuration:</p> <p>Latch: This is applicable to external inputs only. This is not applicable to the trigger on the tool handle.</p> <p>Yes – when selected causes the START input to latch internally after a time period has elapsed. This means the physical START input can be removed without stopping the tool. The tool will run until the currently active Job is complete or times out. A TIME parameter becomes available to set how long the START input must be applied, in seconds, before the Latch becomes active.</p> <p>No – when selected turns the Latch function off.</p>
STOP	<p>When asserted, the controller will stop the tool. It will also keep the tool from running while it is applied.</p> <p>When removed nothing will happen other than the tool will be allowed to run.</p> <p>Configuration: None</p>

Tau Controller

Inputs	Description
JOB SELECT BIT	When asserted or removed, the controller selects a Job. This is one bit of a binary number created by this bit and operates in the Binary + 1 mode. Configuration: None
REVERSE	When asserted, the controller will place the tool in Reverse (Disassembly) mode. This will NOT run the tool in Reverse; it simply changes the tool mode from Forward to Reverse. When removed the controller will place the tool into Forward (Assembly) mode. The size of this input function is 1 bit. Configuration: None

4.2.2 Output Descriptions

Each of the four output elements has two contact types, each with their own dedicated pin. Wire the plant connection to the appropriate contact type pin to match the specific plant integration scheme.

Contact Type

The Contact Type can be Normally Open (N.O.) or Normally Closed (N.C.).

Output Type

The Output Type defines the behavior of the output signal.

Normal – The output asserts and stays asserted until a reset condition occurs.

Minimum On Time – Keeps the output asserted for this minimum time, in seconds, even though a reset condition occurs. After the timer is finished the output will reset if a reset condition has occurred otherwise it will remain asserted until a reset condition occurs.

Timed – The output asserts for this period of time then resets on its own without waiting for the reset condition to occur.

Time – Units are in seconds.

Sourcing Outputs (PNP type)

If Pin-15 is wired to Pin-16 to supply the outputs, and an output is asserted, the Normally Open output pin will transition from 0VDC to 24VDC. The return from the load must be wired to Pin-1.

Sinking Outputs (NPN type)

If Pin-1 is wired to Pin-16 to supply the outputs, and an output is asserted, the Normally Open output pin will transition from 24VDC to 0VDC. The return from the load must be wired to Pin-15.

Outputs	Description
IN CYCLE	This output asserts when the tool torque level, during the tightening cycle, exceeds the Threshold Torque value. It resets when the tool is shutoff either by reaching target, a fault, a Stop input, a Start input removed or by the operator. The size of this output function is 1 bit. Configuration: Contact Type
CYCLE OK	Asserts when a tightening cycle that exceeds the Threshold Torque is completed and the achieved torque and angle are audited within the limits of the audit step. Resets when the tool exceeds Threshold Torque on the next tightening cycle. The size of this output function is 1 bit. Configuration: Contact Type

Outputs	Description
CYCLE NOK	<p>Asserts when a tightening cycle that exceeds the Threshold Torque is completed and the achieved torque and angle are audited outside the limits of the audit step. Resets when the tool exceeds Threshold Torque on the next tightening cycle. The size of this output function is 1 bit.</p> <p>Configuration: Contact Type</p>
READY	<p>Asserts when the controller is energized and there are no faults and there is nothing disabling the tool, such as Error Proofing or a Stop input. See section 2.2.6 for the conditions that can Stop Tool Operation. Resets when the controller is turned off or there is anything stopping the tool from operating. The size of this output function is 1 bit.</p> <p>Configuration: Contact Type</p>

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Glossary

Abort Timer	The tightening cycle aborts if the tool does not shutoff on target before this pre-selected time.
Acceleration	The rate at which the controller increases tool speed from 0 (stopped) to the Speed value.
Accept Tone	Controls the tone made from the handle of handheld QPM tools for accepted tightening cycles. Allows distinct tones for tools in adjacent workstations.
ATC	Adaptive Tightening Control allows a consistent achieved torque to be maintained over a wide range of joints. Manual downshift should be used when: <ul style="list-style-type: none">• High Prevailing Torques – Prevailing Torque > 20% of the Torque Set Point (TSP).• High Starting Torque – Starting Torque > 20% of TSP.
Batch Count	The number of OK tightening cycles to complete a job. The Run display shows the accumulated and target counts for the selected job.
Downshift Mode	Disable: no downshift; Manual: Occurs at specified torque; ATC automatically adapts to the joint.
Downshift Speed	Once the tool reaches the Downshift Torque point, the controller changes the operating speed of the tool from the initial tool Speed to the Downshift Speed.
Downshift Torque	The controller changes the operating speed of the tool from the initial Tool Speed to the Downshift Speed at the Downshift Torque level.
High Angle	Anytime the peak angle recorded exceeds the High Angle, the tightening cycle is recorded as a reject for high angle, the red light illuminates and the tightening cycle is given an overall status of NOK.
High Torque	Anytime the peak torque recorded exceeds the High Torque, the tightening cycle is recorded as a reject for high torque, the red light illuminates and the tightening cycle is given an overall status of NOK.
Low Angle	Anytime the peak angle recorded during the Angle Audit Step fails to reach the Low Angle, the tightening cycle is recorded as a reject for low angle, the yellow light illuminates and the tightening cycle is given an overall status of NOK.
Low Torque	When the peak torque recorded fails to reach the Low Torque, the tightening cycle is recorded as a reject for low torque, the yellow light illuminates and the tightening cycle is given an overall status of NOK.
MFB Mode	Controls the operation of the multiple-function button (MFB) on QPM tools. The choices for handheld tools are Disable, Reverse (Disassembly), Parameter Select, Arming and Reset Reject. The default value is Reverse.
PM Counter	Records the number of tightening cycles completed since the last time it was reset for Planned Maintenance.
PM Limit	When the PM Counter exceeds the PM Limit, the controller provides a maintenance alert.
Parameter Set	A Parameter Set is a collection of instructions that define how the tool should perform the tightening process. It may be selected from the keypad or 24V device such as a socket tray.
Reject Tone	Controls the tone made from the handle of handheld QPM tools for rejected tightening cycles. Allows distinct tones for tools in adjacent workstations.
Slow Seek	Slow Seek helps engage the socket or fastener at a pre-selected speed, torque level and angular rotation. Once engaged, the tightening cycle completes at a higher speed. Slow Seek prevents cross-threaded fasteners and previously secured fasteners from being counted in a batch.

Snug Torque	The controller begins to monitor the tool output for angle at this torque. Any increase in angle after the snug point results in a corresponding increase in the tension or clamp load within the joint.																																				
Soft Stop	Soft stop minimizes the torque impulse to the operator during tool shutoff at the end of the tightening cycle.																																				
Speed	The speed at which the tool operates during the initial portion of the tightening cycle prior to ATC or downshift.																																				
Spindle	A spindle represents the tool, its cable and connected controller.																																				
Strategy	Identifies what variables will be used to control the tool during a tightening cycle.																																				
Thread Direction	Sets assembly direction to clockwise (CW) or counter clockwise (CCW).																																				
Threshold Torque	Sets the point at which the tool is considered to be "performing work", the tool and controller tightening cycle status lights turn off, the controller displays dashes (----) for data, and the "In Cycle" output is turned on.																																				
Tool Tones	Distinctive sounds assigned to tool functions.																																				
Torque Calibration	Determines how torque values are assigned to the electrical signals from the torque transducer on the tool. This value is unique to each tool and changes over time.																																				
Torque Target	When the tool is being controlled for torque, the torque target instructs the controller when to shut the tool off. The torque target should be greater than Low Torque and less than High Torque, and is required for torque control.																																				
Trace	A display plot of torque vs. time (or angle) of a tightening cycle.																																				
Trip Counter	Records the number of tightening cycles completed since the last time it was reset. It is usually used as a supplementary count of the PM Counter.																																				
Units	<p>The following torque units and associated labels are used with Stanley controllers and tools. The labels are derived from SP811, <i>SI Unit rules and style conventions</i> from the National Institute of Standards and Technology</p> <table border="1"> <thead> <tr> <th>Abbreviation</th> <th>Common Term</th> <th>= 1 lbfft</th> <th>= 1 Nm</th> </tr> </thead> <tbody> <tr> <td>Nm</td> <td>Newton meter</td> <td>1.355817</td> <td>1</td> </tr> <tr> <td>Ncm</td> <td>Newton centimeter</td> <td>135.5817</td> <td>100</td> </tr> <tr> <td>Ndm</td> <td>Newton Decimeter</td> <td>13.55817</td> <td>10</td> </tr> <tr> <td>kgm</td> <td>Kilogram meter</td> <td>0.138 255 2</td> <td>0.101 971 6</td> </tr> <tr> <td>kgcm</td> <td>Kilogram centimeter</td> <td>13.825 52</td> <td>10.197 16</td> </tr> <tr> <td>ft lb</td> <td>Foot pound</td> <td>1</td> <td>0.737 562 1</td> </tr> <tr> <td>in lb</td> <td>Inch pound</td> <td>12</td> <td>8.850 745</td> </tr> <tr> <td>in oz</td> <td>inch ounce</td> <td>192</td> <td>141.611 9</td> </tr> </tbody> </table>	Abbreviation	Common Term	= 1 lbfft	= 1 Nm	Nm	Newton meter	1.355817	1	Ncm	Newton centimeter	135.5817	100	Ndm	Newton Decimeter	13.55817	10	kgm	Kilogram meter	0.138 255 2	0.101 971 6	kgcm	Kilogram centimeter	13.825 52	10.197 16	ft lb	Foot pound	1	0.737 562 1	in lb	Inch pound	12	8.850 745	in oz	inch ounce	192	141.611 9
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Appendix A – Controller Gateway

Requirements for Tau Controllers Using the Controller Gateway (Serial Connection):

- Computer with Microsoft Windows XP and one serial port (can be a USB to serial adapter)
- QC0001 Tau Controller v1.0 or above
- Javascript enabled browser and Adobe Flash Player

The Controller Gateway is a Windows based software program that provides a web based interface to a Tau controller connected via a serial link.

Installing the Controller Gateway

Using the provided installation media, run the setup program and follow the on-screen instructions. During installation, TCP/IP ports for the web interface and the live event interface can be set. Leave the default values unless you understand their meaning and require a port change for your specific environment.

Running the Controller Gateway

The installer sets the Controller Gateway to automatically launch each time the computer is started. When Controller Gateway is running, a small icon appears on the system tray or Windows Task bar (typically at the bottom right corner of the screen).

Right-clicking on the Controller Gateway icon displays its menu. From the menu, select the Auto-Connect option. Note that Auto-Connect is the default option; this means that double-clicking the Controller Gateway icon also starts the auto-connection process.

The auto-connection process launches the default web browser and examines the computers available serial ports. The Controller Gateway seeks each port for a compatible Stanley controller connection. When one is found, the browser displays the main menu. From the main menu, setup, maintenance and analysis functions can be performed.

If a compatible controller is not found, the auto-connect mechanism offers to try again. If you choose to not try again, the browser is redirected to an “Offline Mode” menu. In offline mode, setups and configuration file exports can be created. These files can be imported to a connected controller in the future.

Warranty

Mechanical Products Limited Warranty:

STANLEY ASSEMBLY TECHNOLOGIES (“Stanley”) warrants its Assembly Technologies mechanical products to the original purchaser to be free from deficiencies in material or workmanship for the useful life of the product.

Under this lifetime limited warranty Stanley will, at its discretion, repair or replace any product which, upon inspection, is acknowledged by Stanley to be defective.

This limited lifetime warranty shall apply to products which have been used under normal operating conditions for their intended use and shall not apply to products which have been subjected to: abnormal wear and tear, abuse, misuse, improper maintenance, negligence, continued use after partial failure, accident, alterations or repairs with non-genuine Stanley replacement parts.

Electronic Products Limited Warranty:

Stanley warrants its Assembly Technologies electronic products to the original purchaser to be free from deficiencies in material or workmanship for a period of one year after the date of shipment.

Under this limited warranty Stanley will, at its discretion, repair or replace any product which, upon inspection, is acknowledged by Stanley to be defective.

This warranty shall apply to products which have been used under normal operating conditions for their intended use and shall not apply to products which have been subjected to: abnormal wear and tear, neglect, component degradation, improper handling, overload, abuse, misuse, improper maintenance, use with improper accessories, or where alterations have been made.

Software Products Limited Warranty:

Stanley warrants its Assembly Technologies software products to the original purchaser to be free from deficiencies in material or workmanship for a period of one year after the date of shipment.

Under this limited warranty Stanley will, at its discretion, make available replacement software or an upgrade for any product which, upon inspection, is acknowledged by Stanley to be defective. Installation of the software shall be the responsibility of the requestor.

This warranty shall apply to products which have been used with specified, compatible hardware under normal operating conditions for their intended use and shall not apply to products which have been: modified, misused, improperly handled, improperly maintained, or used with non-compatible hardware or accessories.

OEM Products Limited Warranty:

Some Stanley Assembly Technologies custom engineered systems include components manufactured by others. The limited warranties of each individual manufacturer shall apply to these components and Stanley makes no representation or warranty of any kind, expressed or implied, with respect to such components.

General Terms:

This limited warranty gives you specific legal rights and is in lieu of all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose. Some states and countries do not allow limitations on implied warranties, so the above may not apply to you. You may also have other rights which vary by state or country.

Stanley shall not be responsible for incidental or consequential damages or the inability to use its products for any purpose whatsoever. Stanley's maximum liability shall not in any case exceed the

Tau Controller

contract price for the products claimed to be defective. Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so this specific limitation or exclusion may not apply to you.

Specification Changes:

Stanley retains the right to discontinue and/or change specifications of any Assembly Technologies products without responsibility for incorporating changes in products already sold.

Warranty Claims:

To apply for warranty consideration, the original purchaser should take the following action:

Contact the Stanley Assembly Technologies customer service department to obtain a "Return Authorization Number" and "Warranty Claim Report Form."

Package the product including proof of purchase and the completed warranty claim form.

Note the Return Authorization Number on the exterior of the package and return freight to:

*Stanley Assembly Technologies
5335 Avion Park Drive
Cleveland, Ohio 44143-2328*

In the event that a product is repaired or replaced under the terms of the warranty, the warranty period of the repaired or replacement product shall be limited to the remaining portion of the original warranty period.

Product Services

Stanley provides full services for design, modification, service, repair, and training on Stanley products.

Contact **STANLEY ASSEMBLY TECHNOLOGIES** or their agents for information on training courses to aid users in becoming familiar with operations, maintenance, or programming of the Stanley DC electric tools and controllers.

No modification of Stanley tools and controllers can be made without the express permission of **STANLEY ASSEMBLY TECHNOLOGIES**. Refer all service to **STANLEY ASSEMBLY TECHNOLOGIES**, or their representatives.

Return Material Authorization (RMA) Procedures

A Return Material Authorization or RMA is required before returning any material for warranty or repair service.

- Contact **STANLEY ASSEMBLY TECHNOLOGIES** or their agents.
- Request Customer Service or Repair Services.



NOTE:

An RMA can be given without a purchase order. However, non-warranty repairs cannot be performed until a written purchase order or credit card authorization is received.

- Have the following information available for the person answering the telephone to obtain an RMA:
 - Company name and address.
 - A contact name and telephone number. If possible, have facsimile and pager numbers (if any) available.
 - The Stanley model number, serial number, and description for the item
 - A short description of the problem.

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